RUST GEOTECH INC.

Spectral Gamma-Ray Borehole
Log Data Report

Borehole 22-11-08

Log Event A

Borehole Information

Farm : BY	**Tank :** BY-111	**Site Number :** 299-E33-56
N-Coord : 45,970	**W-Coord :** 53,595	**TOC Elevation :** 656.20
Water Level, ft :	**Date Drilled :** 12/31/1944	

Casing Record

Type : Steel-welded	Thickness, in. : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 100	
Type : Steel-welded	Thickness, in. : 0.365	ID, in. : 10
Top Depth, ft. : 0	Bottom Depth, ft. : 150	
Type : Steel-welded	Thickness, in. : 0.500	ID, in. : 12
Top Depth, ft. : 0	Bottom Depth, ft. : 50	

Cement Bottom, ft. : 150 **Cement Top, ft. :** 148

Borehole Notes:

This borehole was drilled in 1944 and completed with 12-in.-nominal-diameter steel casing to a depth of 50 ft and 10-in.-nominal-diameter steel casing from 0 to 150 ft. The 10-in. casing was perforated with 6 slots per foot from 48 to 148 ft. A cement plug was placed in the bottom of the borehole at 150 ft. The casing at the ground surface, as measured in the field in 1995, was 5/16-in.-thick, 6-in.-nominal-diameter steel casing. Although no records are available, this borehole has probably been reconfigured since 1944, such that 6-in. casing was placed inside the 10- and 12-in. casings to a depth of 100 ft or more. It is likely the annulus between the 6-, 10-, and 12-in. casings was grouted, although there is no report of this action. The remainder of the borehole below 100 ft may have been grouted or otherwise abandoned, because logging devices have not reached lower depths since at least 1978. In summary, the exact configuration of this borehole is unknown.

Equipment Information

Logging System : 2	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 03/1995	**Calibration Reference :** GJPO-HAN-1	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number : 1	**Log Run Date :** 9/14/1995	**Logging Engineer:** Widdop/Pearson
Start Depth, ft.: 98.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 6.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Borehole 22-11-08

Log Event A

Log Run Number :	2	**Log Run Date :**	9/15/1995	**Logging Engineer:**	Widdop/Pearson
Start Depth, ft.:	7.0	**Counting Time, sec.:**	100	**L/R :** L	**Shield :** N
Finish Depth, ft. :	0.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Analysis Information

Analyst : P.D. Henwood

Data Processing Reference : P-GJPO-1787 Analysis Date : 3/22/1996

Analysis Notes :

This borehole was logged in two log runs. The pre- and post-survey field verification spectra show consistent activities, indicating the logging system operated properly during data collection. Energy calibrations differed because of gain drift in the instrumentation. Gain drifts during data collection necessitated energy versus channel number recalibrations during processing of the data to maintain proper peak identification. A depth overlap, where data were collected on separate days at the same depth, occurred in this borehole at 6 ft. The calculated concentrations were within the statistical uncertainty of the measurements, indicating very good repeatability.

The casing thickness at the surface has been measured as 5/16 (0.313) inch. Casing-correction factors for a 0.33-in.-thick steel casing were applied during analysis. Because the configuration of the borehole is uncertain, the potential exists for significant gamma attenuation from possible double casings and grout in the borehole. The calculated concentrations should be considered to be an inaccurate representation of the actual formation concentrations.

Cs-137 was the only man-made radionuclide identified in this borehole and was measured almost continuously from the ground surface to about 30 ft and at a few isolated locations in the remainder of the borehole. Uranium that has been processed, and therefore is a potential contaminant, appears to exist at 62 ft in depth. Protactinium-234, which emits a gamma ray with an energy of 1001 keV, was measured at this depth at a concentration of about 26 pCi/g. Other uranium series progeny such as Bi-214 (609 keV and other energies) do not show a corresponding increase, suggesting the uranium is not in equilibrium with its progeny, and hence is a result of processing.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank BY-111.

Log Plot Notes:

Separate log plots show the man-made (e.g., Cs-137) and the naturally occurring radionuclides (K-40, U-238, and Th-232). The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

A combination plot includes both the man-made and natural radionuclides, in addition to the total gamma derived from the spectral data and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data with no attempt to adjust the depths to coincide with the SGLS data.

Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence

Borehole 22-11-08

Log Event A

intervals. Open circles on the plots give the minimum detection level (MDL). The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.